

Purpose of Compliance Assessment

This compliance assessment covers the following regulatory activities for Hexion, Environmental Permit: EPR/PP3238LX/V002:

- Site inspections and site meetings: 20th March 2015, 18th August 2015 and 26th February 2016.
- Review of Fugitives Emissions management plan: permit condition - 3.3.1 & Table S1.4.
- Routine monitoring data: permit conditions – 3.1.2, 3.1.3, 3.6.1, 4.2.2 & Tables S4.1, S4.2, S4.4 & S4.8, S5.1, S5.4.
- Annual submissions as required by permit condition – 4.2.1 & Tables S5.2, S5.3, S5.4.

Other aspects of regulatory compliance were also discussed:

- Hexion Site Condition Report.
- Improvement Programme status.
- Incidents, accident management and notifications required in accordance with permit conditions – 4.3.1, 4.3.2.
- Dow Chemicals GW remediation and use of Hexion ETP.
- Borax batch proposals.
- IED BAT Conclusions and permit review timetable and vertical BRef.
- Sealine integrity testing.
- Permit variation, prompted by closure of Ineos and Zeon and effluent treatment plant monitoring, boiler emissions, other issues to look at such as ceased activities, corrections to permit tables and reporting forms, assessment of best basis for setting ELVs.
- Operator Monitoring Assessment compliance work for 2016.

Routine Monitoring Data

All routine monitoring submissions (p.c. 3.1.1, 3.1.2, 3.6.1, 4.2.2) were made on time and no Emission Limit Value (ELV) breaches reported – for the period: Jan 2014 – Mar 2016. The permit should refer to Tables S4.1, S4.2 and S4.8 (not S4.3). Any former Ineos and Zeon related parameters will need to be varied out of the permit at some point – during the BRef review variation for example. AK will request that the emission point plan is up to date and accurate. This should include all emission points, even those with no limits e.g. tank vents and LEVs. The sealine should also be reflected on the plan in Schedule 2 of the permit, from where it leaves the site physical boundary and the route it takes to the diffuser head in the Severn estuary.

Form E1 needs amending as the free formaldehyde parameter is listed as emission point W1 in column 1, but should be E1 – this is the effluent data into the clean lagoon from the lamella separator – ideally process monitoring would look at the quality of effluent entering the overall treatment system (dirty lagoon, DAF, BAFF and lamella separator) – this an item to consider in permit variation discussions. It is understood that the site have process monitoring data, but the permit does not require it to be reported to NRW. There are some administrative changes to the notes in the reporting forms that need to be made by NRW, i.e. note 4 is listed as note 5 above the average result column – this will be addressed by the permit variation. There is also a question mark over the two maximum daily volume of effluent released limits.

The site are required to submit data for W1 (ETP into Severn Estuary) and E1 (treated into clean lagoon) every three months and annual mass emissions (see Table S4.4) from W1. There are no limits for E1. 2015's mass release for methanol is almost double the mass released in 2014. Acrylonitrile is reported as zero for 2015; even though Zeon finished production in Dec 2015, it would be expected that there would be a mass release figure for 2015 for this parameter. In 2014 581kg was released. W1 monitoring is on a weekly basis and this is reflected on the monitoring returns. pH, flow rate and flow volume are monitored on a continuous basis.

For air emissions, reporting is on an annual basis and monitoring is annual spot sample for the boiler stacks (A1) and every three months for the reactor vents and fume scrubber system. IB (Hexion) reported an issue with boiler results reporting – see below under the section discussing the future permit variation. In terms of compliance with ELVs (only applicable to A1), notwithstanding the boiler issue mentioned above, the results are compliant.

On a general basis more detail is required in the monitoring returns, for example test method and uncertainty for parameters reported at W1 where these columns on the reporting form are blank.

Action 1 Hexion 19th May 2016: *Provide an explanation for the increase in annual mass of methanol released in 2015 compared to 2014 and the absence of annual mass release of acrylonitrile for 2015.*
Due: 30th June 2016.

Action 2 Hexion 19th May 2016: *Provide missing details as required by monitoring forms, e.g. method uncertainty and monitoring method.* **Due: In Quarter 2 2016 monitoring submission.**

Reference should be made to the latest M18 monitoring emissions to water / sewer guidance; Appendix 4 lists the recognised monitoring methods and agreement should be made between the operator and regulator on any deviations from methods listed in the permit – although it is expected as the permit becomes older, the operator will move to more recent published standards according to M18.

An OMA is planned for 2016, where an assessment of the operators sampling and analysis and data interpretation will be conducted.

Annual Reporting

This section covers the annual submissions (excluding annual monitoring data – above) as required by permit condition 4.2.1 and should include performance parameters (water and energy usage), total production, a review of the monitoring results over the year, annual improvements and progress as set by the site EMS and any details of site contamination / decontamination – see section on notifications.

Performance data and production for years 2014 and 2015 (2013 figures were processed by the previous officer) and EMS targets for 2013, 2014 and 2015 have been assessed below.

2013 EMS Targets: p.c. 4.2.1(b) – Hexion conduct an annual Environmental Review in line with ISO 14001. Amongst the specific items mentioned are:

- Assessing ways to reduce mixed chemical waste.
- Redoing carbon footprint.
- Update permit.

- Reviewing electricity use.
- Reviewing scrubber operation during “upset conditions”.

An external audit fed back comments about Hexion being able to provide evidence of compliance with all relevant environmental legislation, not just the EPR permit – i.e. an accurate and up to date Legal Register within the EMS. The assessor also suggested that the training matrix should be updated so that key roles have the relevant training and skills mapped to their role. The internal audit schedule is also mentioned.

Some other relevant environmentally relevant work has been:

- 4 boreholes advanced around the effluent lagoons – in order to monitor lagoon integrity.
- Ongoing groundwater (GW) studies with Excal – with a view to establishing the site baseline for EPR & IED compliance.

2014 EMS Targets – For this year only a brief table of items and targets was provided. Highlights are:

- No spills or releases by accident.
- Reduction (compared to 2013) in water use; gain in electrical efficiency; improved steam efficiency.
- Used IBCs sent back for re-use.
- 6 ISO 14001 audits carried out on specific EMS areas.

2015 EMS Targets – A similar table to 2014 with some additional commentary provided. One metric reversed its earlier improved performance: towns water use increase; and steam generated failed 2015 target, but was lower than 2013 and 2014. The town’s water increase in use was at least partially explained by failure of the non potable water source and increased cooling water top up – to aid corrosion inhibition.

NRW offers the following comments:

- The Regulatory Officer (RO) acknowledges the use of a table to compare previous years with most recent targets.
- NRW suggests that the operator provides some explanation on how objectives and targets are selected, performance criteria set and performance managed.
- This could be presented by way of an annual environmental report referring back to permit condition 4.2.1 (a) – (e) inclusive and criteria set out in the site EMS; such as:
 - Focus on significant environmental aspects that have an adverse effect on the environment
 - Define significance
 - The above should support the overall Environmental Policy
 - Develop an environmental programme which implements the actions required to achieve your environmental objectives
 - Assign roles for environmental performance development, delivery and reporting
 - Describe how performance is managed and monitored throughout the year – describe framework and tools used (internal audits, management review, training, communications to staff and stakeholders etc.) – culminating in an environmental report
- Some areas to be considered as requiring annual feedback and being included in an environmental report could be:
 - Number of internal audits

- Internal procedure reviews
- Improving internal procedures, such as using more up to date standards e.g. monitoring
- Evaluating performance of ETP technology
- Evaluation of using less hazardous raw materials and / or lower quantities – even if customer requirements preclude this, mention it has been considered and / or work / research is being carried out with customers and central R&D
- How many people have had environmental awareness, EPR awareness and incident / accident response training
- Include other annual compliance items, such as reviewed fugitive emissions and concluded no significant losses (provide basis for estimation / calculation); accident management reviewed – detail any improvements
- Tabulate previous year's objectives: realised; carried over; delayed; cancelled – explain. Keep several years rolling so easy comparison can be made.
- Include in the annual submission how non conformities are handled.

This is not exhaustive, but aims to stimulate thought around environmental performance.

Recommendation 1 Hexion 19th May 2016: *Permit condition 4.2.1(a) requires some interpretation of the routine monitoring results in the annual submission. Brief comments were made in the annual submission for 2015, but these didn't explain, for example, the increase in annual mass of methanol released in 2015 compared to 2014 or the absence of acrylonitrile mass quantity for 2015 – see Action 1 above. In addition some statement should be made, not just about permit compliance, but whether results have deviated significantly from those assessed during permit application (or as a result of any output from Improvement Conditions) and whether the results show any obvious trend. Please provide this detail on the next annual submission for p.c. 4.2.1(a).*

Annual Performance Parameters 2014 & 2015: p.c. 4.2.1(c)(d) – In terms of energy (electricity and gas) used through 2014 and 2015, the figures are relatively stable; the main facts to be gleaned:

- Overall production increased by 5.93% for 2015 compared to 2014
- Overall energy used per unit output has been submitted as the same for both years: 0.43, although it is very slightly lower in 2014 taken to three decimal places (i.e. 0.433 vs 0.432)
- Overall energy used is 6.21% more than in 2015 compared to 2014

There is a column to reflect the primary energy, i.e. the energy assumed to be produced at a power station in order, minus thermodynamic inefficiencies, to supply the figures used as declared by the site (i.e. 14403MWh 2014 and 15297MWh 2015) on form Energy1. These columns need to be filled in on future forms. The conversion factor of 2.4 is nationally used for comparison.

Water use has increased by 79.57% for 2015 compared to 2014 – the site commentary on performance year 2015 sought to explain this by way of interruption to non potable supply and the cooling water top up situation, which was to be kept under review. The increase in non potable water supply use is significant – is this all attributable to cooling water top up; especially when bearing in mind only a 5.93% production increase? This trend is borne out also by the cubic meters of water used per tonne of product, increasing from 1.90m³/t 2014 to 3.2m³/t 2015.

Action 3 Hexion 19th May 2016: *Confirm what factors have contributed to the 79.57% increase in water usage and / or provide details on the amount used for the additional cooling water make up. Is there any industry benchmark on water use per tonne of product; for example other Hexion plants. Provide information on where the cooling water and boiler feed water is lost in the system and how this*

compares to BAT (Cooling Systems BRef) for forced draft cooling towers and combustion systems. Due: 30th June 2016.

There is often a balance to be made and a trade-off between benefits to be gained with one initiative contributing to lower performance of another criteria. For example increasing cooling water top up to inhibit corrosion against reducing water usage. What performance factors does Hexion draw upon when evaluating the cooling water system and boiler water blow down system, i.e. concentration factor ratio to top up verses blow down etc? It is noted that the permit application states that approximately 14% and 22% of overall water used is down to the cooling system and boilers respectively. Is this still the case?

The site have not declared any contamination events or decontamination work, e.g. ongoing site remediation.

Fugitive Emissions Management

Permit condition 3.3.1 and Table S1.4 lay down what is required to demonstrate compliance. Table S1.4 points the operator to review fugitive emissions in line with the sector guidance note (SGN) on speciality organic chemicals. While no timescales are given in the permit, it is recommended that a review of fugitive emission sources, their identification, measurement (estimation or calculation) and prevention is conducted at least when the SGN or BRef is reviewed and under other plausible scenarios, e.g. a new substance or process that may generate emissions is introduced – although the latter would ordinarily be dealt with under a permit variation.

In previous compliance assessment, the RO requested the operator submit a review of their fugitive emissions management plan and update the 2009 submission. This was received in June 2014 and comments on its content are included below.

Both the fine / speciality organic BRef (2006) and EA SGN (2009) predate this submission, but are subsequent to the original permit application. IC6 related to fugitive emissions from subsurface structures, this item was signed off as complete in December 2007, with an intention to review the implementation of the action plan; IC7 required a plan for improvements to the diesel tank off load and fill, this was signed off in May 2010.

Action 4 Hexion 19th May 2016: *During the next routine inspection planned for 2016, the operator should confirm the status of the output of IC6 & IC7 (e.g. drain survey results; improvements around diesel store etc.) with a view to ensuring everything that may have been proposed as an improvement to prevent or reduce fugitive emissions to ground / GW, has been implemented. Due: At next inspection (not OMA) in 2016.*

The permit application, supported by text in the decision document, describe the potential sources of fugitive emissions and their control, i.e. tanker offloading / loading, reactor vents, tank breather vents, sub surface structures and seem to indicate the low contribution the various sources have in terms of emission benchmarks. The 2014 review is basically an extract from the COMAH SR and while useful has not described the whole picture in terms of substances, sources, activities and processes and when last measured or the calculations and assumptions behind estimates of losses, e.g. from storage tank vents, were last reviewed. Further, the permit decision document confirms the determining officer was not satisfied with the level of information given in the application and created ICs to address this for tanks and vents. However, the ICs do not seek specifically to look at these potential sources, they concern subsurface structures and the diesel tank.

The operator should draw on information already in existence and conduct an updated fugitive emissions management review and management plan. This should take known information from the application, ICs and any other relevant submissions made during the life of the permit and tabulate all potential sources of fugitive emissions: the substance, phase and conditions of storage and quantity and what processes the substance is involved in that could contribute to fugitive emissions. For example: formalin, stored heated (at x temp), in storage vessel (x volume), with potential releases from (x inch) breather vent and from tankers during off loading and loading of product and through pump seals or flanges during charging or transfer. The control measures should be described (e.g. vapour return, vacuum / pressure vents, conservation vents, vent to scrubber) along with the methodology used to calculate and / or estimate potential losses over a typical year.

The aim is to understand all sources (from a combination of substance and what activities it undergoes); how they have been estimated as significant or not; what active control measures exist – vapour return, vacuum / pressure vents; what passive controls exist – low solar absorbance tank paint, tank insulation, pump seals, gaskets and pipe joints; what management techniques exist – careful management of inventory level, monitoring, reviewing, maintenance and surveillance; and what gaps there may be and resultant improvements required – above ground transfer systems, drain surveys, review of fugitive emission monitoring against benchmarks etc. This kind of work can often have financial benefits as well as environmental benefits.

Recommendation 2 Hexion 19th May 2016: *A fugitive emissions review shall be initiated between RO and the operator in a phased manner over the 2016 regulatory year and a kick off discussion at the next site meeting.*

Improvement Conditions Status

Permit conditions 2.5.1, 2.5.2 and Table S1.3 describe the ICs when the permit was issued. NRW records indicate that all ICs have been signed off as complete except IC 4 and IC11.

IC11 required a demonstration of MCerts accreditation. The effluent flow meter went through MCerts certification and the site acknowledged that the scheme should extend (in terms of Hexion) to external laboratory analysis and stack emissions monitoring. These elements will be covered in the OMA planned for 9th June 2016. **IC11 is closed.**

IC4 concerned the assessment of the biological ETP. A revised H1 assessment was received from Hexion in May 2013. NRW fed back in July 2013 on the H1 results and that three items of IC4 were still outstanding: investigations into formaldehyde reduction; inspection of sludge build up in clean lagoon and sludge removal and upper threshold limit to protect ELVs; prevention of spillage. The IC required a report, including an environmental assessment (e.g. H1 or at least equivalent) covering these items, aiming to provide information and operational parameters in order to optimise ETP performance (compliance with ELVs and overall efficiency of pollutant removal and energy consumption). The IC stated that such an assessment should not be limited to the four bullet points under IC4 in table S1.3.

Applying the possible scenario that the revised CWWT BRef may trigger permit reviews (due to the uncertain direction of the IPPC Bureau's chemical strategy for the other vertical chemical industry BRefs) and taking limits in the final CWWT Draft 2 BRef, Table 4.1:

- TOC BATc is 10 – 33mg/l (notes apply);
- COD BATc is <30 – 100mg/l (notes apply)

- Formaldehyde – no BATc in CWWT (may have to refer to vertical BRef process control and ELVs on influent) – annual average EQS is 5ug/l
- Phenol – no BATc in CWWT (see parenthesis above) – annual average saline EQS is 7ug/l
- Permit ELVs:
 - No TOC ELV
 - COD – 1000mg/l
 - Formaldehyde – 10mg/l
 - Phenol – 10mg/l

Your revised H1 assessment indicated process contributions (release and immediate dilution) close to the EQSs and that further work should be considered, e.g. modelling. In the Mar 2014 CAR1 it is stated that Hexion provided a response to the three outstanding items in Oct 2013 (email off BM) – AK cannot find a record of this. The CAR1 recommended further discussions on this subject. Hexion provided another response after a Jan 2014 inspection in Mar 2014 – it is these items we need to follow up on.

IC4 remains open.

Recommendation 3 Hexion 19th May 2016: *The operator and NRW should review the responses and correspondence above, in light of the CWWT BRef and any relevant vertical BRef, at a future site meeting to be arranged during compliance year 2016. The output should be an assessment of the ETP performance around typical operating parameters and standards: removal efficiency, energy costs, compliance with ELVs, stability of operation, dealing with shock loads or other atypical conditions (weather, influent fluctuations), i.e. is the ETP BAT.*

Accident Management and Notifications

Accident management was discussed in part during a COMAH intervention in Jan 2015. Permit condition 1.2.1 requires a written AMP and implementation and review of said plan. The operator has made reference to their COMAH internal and external emergency plans. AK stressed the need to broaden the scope to include sub COMAH scenarios (minor spills, leaking IBCs, diesel spills, venting etc.) and to cover the whole of the site footprint, not just the COMAH area.

In terms of the notification requirements of the permit, conditions: 4.3.1, 4.3.2, 4.3.3 and schedule 6, AK offered this general advice below. Management KPIs and the threat of failing any such measure should not lead operators to fail to report as per the permit on the prescribed form. Submitting a notification does not categorically mean there has been a permit breach.

Guidance on Implied Condition and Notifications

Regulation 46(1) & (7) of EP Amendment Regulations 2013 (SI 390) amended Schedule 5 of EPR 2010 by inserting paragraph 20 after paragraph 19 in Part 1 of Schedule 5. Regulation 13(3) of 2010 EPR makes Part 1 of Schedule 5 apply in law.

Paragraph 20 inserts this as an implied condition to all permits:

“Incidents and accidents: deemed condition of a permit

20. Every environmental permit in relation to a regulated facility to which Schedule 7A,

13A or 14 applies is deemed to contain the following conditions, unless such conditions are

included in the permit—

(a) in the event that the operation of a regulated facility gives rise to an incident or accident which significantly affects the environment, the operator of that regulated facility must immediately—

(i) inform the regulator,

(ii) take the measures necessary to limit the environmental consequences of such an incident or accident, and

(iii) take the measures necessary to prevent further possible incidents or accidents;

(b) in the event of a breach of any permit condition, the operator of a regulated facility must immediately—

(i) inform the regulator, and

(ii) take the measures necessary to ensure that compliance is restored within the shortest possible time;

(c) in the event of a breach of permit condition which poses an immediate danger to human health or threatens to cause an immediate significant adverse effect on the environment, the operator of a regulated facility must immediately suspend the operation of the regulated facility or the relevant part of it until compliance with the permit conditions has been restored.”

The above fills in any gaps and embellishes conditions for notifications in the original permit. All breaches must be reported in addition to any incident / accident that significantly affects the environment and any breach that threatens to cause immediate significant adverse effect on the environment. In addition there is section 4 of your permit re. Notifications. These conditions include reporting of breaches and / or accidents / incidents that are not only causing pollution, but have the potential to cause significant pollution.

The regulatory view is that all incidents, accidents and breaches and results above limit (but analytical uncertainty or some other factor, e.g. resampling results bring the result below limit) should at least be discussed with the regulator and then a decision is made to notify formally using the Schedule 6 notification form or not – in these cases it is almost certain you would have to notify using Part A of the Schedule 6 notice. The key is that the operator will probably be able to make that decision and it will be more or less obvious to notify or not – but if in doubt speak to the regulatory officer. The thing to bear in mind and there is an element of subjectivity to this, is that there must be actual or potential significant pollution, or could significantly affect the environment, or significant adverse effect to the environment and / or human health (using wording from section 4 of your permit and paragraph 20 of Part 1 of Schedule 5 EPR). It could be said any incident that could have led to a release, where the operator can justify that measures employed at the site worked as intended, could be argued, in some cases, does not have the potential to have a significant adverse effect or cause significant pollution to the environment. However this depends on several factors:

- Release from non permitted point or release of non permitted substance from a point source, i.e. simple permit breach.
- Type of substance (toxic, flammable, incompatibility, soluble, dense gases, persistent, environmental fate etc.).
- Amount of substance – is the quantity so trivial it could not cause significant pollution or harm to human health – for non point source (fugitive) emissions.
- Amount of substance – in excess of permit limit at permitted release points, i.e. simple permit breach.
- Did any safety or containment or abatement / suppression measures deploy and work effectively (pressure relief vents, bunds, transport via chemical sewer).

Yes to points 1 and 4 of the above definitely constitutes filling in Part A of the Schedule 6 notice and immediately these will be permit breaches. Answers to the other points will influence the significance or potential significance and aid the regulator in deciding if there has been a permit breach. Take on board the points below when submitting the follow up / RCI in Part B and it is after this submission that the regulator will make a decision on whether there is a permit breach or not (except if yes to points 1 and 4 above):

- Is there a reason (for example from a Root Cause Investigation) that means the underlying cause in a different setting or at a different time or with a different substance and amount, could have led to significant adverse effects or pollution.
- The above point must be rooted in trust between the operator and regulator, because some things proposed by the operator may have to be taken at face value by the regulator.
- A secondary containment system working as designed could well negate any effect or potential effect on the environment – but should not be solely relied upon when improvements to maintenance, surveillance and response could be carried out, i.e. it is not sufficient to say “the leak was captured in the bund”, if RCI reveals poor maintenance practices – see below.
- If RCI revealed poor maintenance, overdue maintenance, incorrect service duty (substance incompatibility), use outside design parameters, staff competency issues etc., then it would not be appropriate to not report, as other permit conditions could potentially have been breached, i.e. management, training, maintenance, operating techniques, BAT etc.
- An act of 3rd party vandalism or some other act of God event that caused a release or breach of containment, that was or was not subsequently held in secondary and tertiary containment or abated, would require notification and you likely could fill in parts A and B together and submit – the regulator is unlikely to view this type of incident as an unauthorised release permit breach – but whether some other condition is breached depends on the operators response to mitigate or prevent pollution, i.e. accident management and associated management conditions.
- The act of God may well be regarded as a non breach, but poor response by the operator, not in accordance with the permit and specified operating techniques and good practice, could lead to breaches of other permit conditions.

On 11th November 2015 IB of Hexion contacted AK to discuss an incident involving sodium hydroxide in an IBC. This is the sort of event that should go on the Schedule 6 form – initial notification of event on Part A, followed up by details from on site investigation into root cause on Part B. The reason this should be reported, notwithstanding any release being held in the chemical sewer, is that the root cause of valve failure could have led to a release at a more vulnerable position. AK considers this

particular incident to not warrant a non compliance score under these particular circumstances, but will expect these sort of incidents to be reported on the Schedule 6 form.

IBC storage was an item on a previous inspection (Jan 2014) and Hexion provided a risk assessment on storage.

Action 5 Hexion 19th May 2016: *During the next routine inspection planned for 2016, NRW will assess the storage of IBCs (locations and containment and spill kits) and other containers and the reasons behind this valve failure and how it was noticed and what was done in accident response and any changes to procedures implemented. NRW to go through the IBC risk assessment (A80_013) with the operator. Due: At next inspection (not OMA) in 2016.*

There was also a tanker incident discussed at site inspection in August 2015 involving the loss of some 700kg.

The failure of the pH probe and loss of a composite sample, will be discussed below under the forthcoming OMA section, but again these are items requiring reporting as per schedule 6, especially the prolonged loss of continuous pH monitoring.

Other Items Relating to Compliance

The site are considering running several batches of a specific product involving **Borax** (or other boron compounds) – this strictly isn't covered by the operating techniques referenced in the permit, but the RO can authorise trials ahead of a permit variation. The details of the initial Borax trial are in NRW files – reference should be made to those exchanges in July 2014.

Hexion will notify NRW when the trials are commencing and it has been agreed that additional monitoring of the effluent will take place.

Action 6 Hexion 19th May 2016: *The operator agreed to submit a more detailed trial paper covering the chemistry used and likely fate of the boron substances that may be considered: borax, boric acid, potassium borate. This will aid the RO in determining what type of permission (letter of agreement or permit variation) will be needed. Due: Before trial commencement.*

Reference should also be made to the reports, results and instructions / conditions agreed when Celtic Technology utilised Hexions clean lagoon and W1 emission point to discharge pumped and treated groundwater from the **Dow Chemical site remediation project** adjacent to Hexion.

This work has now been completed (insofar as Hexions involvement) and there were no environmental issues with the levels of monitored substances in the treated GW.

Centrica, an adjacent power station requested to discharge **1.5m lts of untreated potable water** through Hexions surface water system into the clean lagoon. This water is from Centrica's fire water tank as it requires maintenance.

AK authorised this in an email on 3rd March 2016.

Sealine Integrity Testing

The installation and authorisation to install (flood defence consent) are all confirmed as appropriate and correctly commissioned – see CAR1 31st October 2013 and BAC Annual Inspection of Cathodic Protection System.

The remaining tasks were to establish if CP extended to the diffuser head and to use fluorescent dye at low tide to provide some visual information on the state of the diffuser head – the latter part is proving to be difficult due to colour of the water at this part of the estuary.

The last dye test was in 2014 and in August 2015, AK agreed to 5 yearly testing. Section 10 of the BAC report does stipulate that power supply to the pipeline should be checked annually and they recommended testing the current close to the diffuser to ensure that element is also protected – the diffuser needs to be working correctly as dispersion calculations and resultant environmental assessment for setting limits is influenced by amount and type of diffusion of effluent from the outfall. The report concluded that, **where tested**, cathodic protection at the relevant amount was evident.

Action 7 Hexion 19th May 2016: *The operator is to follow up in writing what the 2014 testing revealed in terms of the state of the diffuser and / or confirm if CP does indeed extend to the diffuser head. Then we can agree the 5 yearly CP testing and annual power supply tests. Due: By next routine inspection.*

Note that the pipeline should be put on the permit installation plan and included in the installation boundary – see variation discussions.

Hexion Site Condition Report

Below is a summary of the main documents. Refer to the letter sent to Hexion in January 2016 by AK commenting on Excal report: 84-01-09. Basically enough data has been gathered, but the presentation of the data and establishment of baseline levels for certain hazardous substances needs to be made again taking on board comments in the aforementioned letter. Specifically averaging average values from data across the whole of the site and using a data pool from several years since permit issue – these could both lead to artificial levels being proposed as the baseline.

- Design SPMP Feb 2007 – NRW comments in memo 30th Mar 2007
- V1 1ST Phase Reporting (ref data) Nov 2007 – NRW comments in memo 22nd May 2008
- V1.1 (revised) 1st Phase Nov 2008 – Geoscience comments via Sally Thompson 19th Jan 2009
 - Martin Doherty also commented in a memo 16th Sep 2010
- PPC team site actions tracker 15th Nov 2012 – mentions 1st phase done but actions not addressed in establishing a baseline. Hexion were guided to a lifetime records approach. Site accepted this. Baseline data still required, but ongoing monitoring not.
- CAR1 and site actions tracker 20th Dec 2012 – proposes a meeting with Geoscience early 2013 to ensure a baseline produced. NRW to arrange site visit with Geoscience.
- CAR1 22nd Jan 2013 – JH and MD – Action 7 Hexion: redraft baseline data to provide a statistically robust data set with interpretation – to include missing data Mar 2012, Nov and May 2010 and Mar 2009. RGN9 and H5 signposted.
- CAR1 31st Jan 2014 and action tracker – ExCal report (Jan 2014) supplied – NRW request Geoscience assistance.
- AK and MD meet and discuss report several times during 2015, culminating in letter sent to site by AK Jan 2016.

It is understood that Hexion have now engaged another consultant to use existing data and take on board comments from the January 2016 letter.

Recommendation 4 Hexion 19th May 2016: *This work should be continued with a view to making a second SCR baseline and proposals before the end of 2016.*

OMA 2016, pH Probe Failure and Missing Composite Sample

An OMA for water and air emissions is planned for 9th June 2016. Comments relating to emissions monitoring and reporting have been made throughout this CAR1. Such comments concern: monitoring methods; IC11 and MCerts; pH probe failure and composite sample missing – see below. The boiler emissions are discussed under the permit variation section below.

The permit requires continuous monitoring of pH at the sealine W1 release point. The loss of continuous monitoring was reported at the 26th February 2016 inspection and the operator supplied a follow up on 11th March 2016. The breakdown of the pH probe on duty, compounded by a defunct spare and then a 4 week lead time for a replacement, led to a lapse in continuous monitoring. The probe was out of action from 28th January 2016 – 18th February 2016.

The actions the site have taken are to buy more spares and store in accordance with manufacturers instructions and to amend the contingency procedure in the event of another breakdown, which at least provides hourly data which is recorded. An example of this procedure and the data gathered during the breakdown on and beyond the 28th January 2016 is included. The probe is now working correctly.

When the pH probe fails this causes the pump to trip (because the pump control logic “thinks” the pH reading is now not between 6 – 9: the permit limit). To get around this, while waiting for the replacement probe and spares, a manual bypass can be activated. This allows the pump to push effluent through the sealine without a pH probe value. A manual sample is taken during this 30 minute pumping. The system stops bypass pumping after 30 minutes and cannot be reactivated for 20 minutes. Essentially this leads to a manual sample every hour. Reference to the attached manual pH sampling log sheet shows when samples were taken (every hour) and the value – on this extract the pH was typically 7.0 – 7.4.

With the review of the maintenance replacement programme, more spares and the review of shelf life and storage conditions (i.e. probe must not dry out), this situation should be avoided in future. Given the relatively stable nature of the production processes, albeit batch basis, NRW is confident that if manual bypass and sampling took place every hour, the likelihood of a breach of the permit ELV is unlikely.

The composite sampling failure will be looked at more closely during the OMA – aspects such as RCI, duplicate sampling and any effect on demonstrating permit compliance will be part of the OMA.

Permit Review, Variation and IED

Several discussions (primarily at CIA meetings) have taken place about IED and permit reviews. An NRW IED event took place on 12th May 2016 and the presentations from the regulator on the BRef

review process, timetable and derogation procedure were distributed to CIA members including Hexion.

There is still an element of uncertainty with regard to when permit reviews will take place. It is believed that while a new common waste gas treatment BRef is being developed (work beginning in 2017), that all other chemical industry BRefs, with the exception of the Common Waste Water (to be issued imminently) and the LVOC BRefs (to be issued by end of 2016), will not be worked upon until at least 2018. The IPPC Bureau is aiming to have refined their chemical strategy to the point that they know whether they will be consolidating, reviewing or not reviewing the other BRefs.

In the meantime there is a possibility that (under Article 21 IED) the CWWT BRef (and indeed the CWGT BRef when issued) may trigger permit reviews instead of the main activity BRef. Operators are asked to follow the progress of the final issue of the CWWT BRef and progress on the CWGT BRef. Whether horizontal BRefs will trigger permit reviews is not certain however, since it depends on the outcome of the chemical strategy – a decision to review all other BRefs will be made (it has been indicated) in 2017. Only after that decision will anyone know whether the standards in the CWWT BRef are to be put into existing permits ahead of any main activity BRefs. This seems more likely if the decision is made not to review the other BRefs, in which case end of pipe treatment BATcs and AELs will probably have to be applied and permits reviewed in the light of these horizontal BRefs.

There have also been several other aspects to be looked at and included in a permit variation – whether this is done as a separate exercise to the IED variation will depend on the significance of the required changes and the target timetable for the main activity BRef and issue of the BATcs.

Zeon and Ineos closure – affecting the make up of effluent Hexion treat – will need to remove ELVs associated with substances from these two sites and reassess Hexion ELVs as there is now less dilution. Dilution is not normally a BAT technique, but in an integrated treatment works, the benefit of a dilute effluent entering the main effluent lagoon may be acceptable; but if this dilute stream ceases, then the primary site has to demonstrate BAT for waste water treatment, i.e. less substances entering effluent, removal within the process, recirculation, segregation of reusable water, defining the best end of pipe effluent treatment.

Notes in emission reporting forms and some columns on the reporting forms have errors and the permit refers to a Table S4.3, which should be S4.8. There are two limits to daily total effluent volume – this needs to be reassessed. The potential outcome of reassessing effluent composition could be to include emission limit parameters, but on a different basis (if appropriate) to simple mass concentration limits, e.g. kg/hr, total mass per year, or surrogate alternative parameters, e.g. sampling the concentration of a parameter in a raw material.

Removing any mothballed activities from the permit and operating techniques, e.g. Novalacs. The addition of the activities involving boric acid etc. would need to be formally included in the permit.

There may also be an issue with the boiler emissions. The permit application initially mentions two boilers, with a total thermal input of 18.2 MW, but ultimately the permit ends up with only one emission point – A1. The actual configuration at the plant is two main boiler stacks, at the same building but several meters apart. On top of that the system utilises two retrofitted economiser stacks (one for each separate boiler); these divert hot exhaust gases to supply heat to the boiler feed water, reducing fuel demand and combustion at the primary boilers. Either the economiser vent or main vent stack can be in use, but only one at a time. The main stacks are used only when testing to see if the boilers can fire on backup oil, or if there are issues with the economisers. The boilers run primarily on natural gas. Therefore the main emission points are the two economiser stacks 2.2m apart.

IB of Hexion has looked at figures used for IC responses, in for example H1 submissions, and the conclusion appears to be that the actual flow rate and emissions concentrations measured for two boilers has been used, i.e. volumetric flow of 10050m³/hr – compared to last annual test results of 4200m³/hr for one boiler.

What needs to be confirmed is the maximum volumetric flow rate when each boiler is operating at full load, i.e. the name plate capacity. NRW is assuming that when the boilers are tested, they are running at full load; in any event documentary confirmation to back up IBs assertions in the note attached to the email of 1st April 2016 is required – not least for input into permit variation calculations. For example an assessment will need to be made on whether to treat the two stacks as one emission point; how do two stacks on the boiler building and any adjacent buildings affect effective stack height, dispersion and ground level concentrations for impact assessment; what operating basis should be assessed: a normal basis or peak load, e.g. both boilers operating at maximum rating simultaneously. Taking the last point, closure of Zeon has resulted in less steam demand and while this may mean less emissions than assessed during permit determination, is there any contra effect due to idling or boilers not running under optimum demand, or many start up events – this will need answering. Hexion are planning to install a steam line to take steam from the boilers so that the boilers are operating as designed. Otherwise the option of removing or reconfiguring one boiler and decommissioning the other will need to be considered.

In the interim it has been agreed that the boiler results will be reported separately in the annual submission.

Site inspections and site meetings: 20th March 2015, 18th August 2015 and 26th February 2016

The above dates have been the on site compliance activities, in addition to various correspondence covering aspects already mentioned in this CAR1 and on top of a COMAH inspection in January 2015.

Work has begun to further assist the site in defining the site condition report baseline – see above.

All routine monitoring and annual submissions have been assessed.

In depth compliance assessment is commencing with the OMA in June 2016; there has been a visit to get an overview of the effluent plant and assess emission points ahead of the OMA.

Generally the site has been operating as intended during inspections and with the exception of the incidents mentioned earlier on, there has been no significant releases or breaches at the site.

The RO has noticed that IBCs are stored in an area that may need reviewing – this is also mentioned above; and that parts of the roadways acting as tertiary containment are in need of repair – it is understood that the main production and raw materials storage areas are all bunded with drains to various sumps and on to the ETP. So, only roadways that are at risk of leaks and spills from incidents involving material storage, material transport, refuelling etc. will need to have adequate tertiary drainage that contains spills and directs them to sumps for removal or on to the ETP if the liquid is capable of being treated and won't adversely affect the ETP and resultant effluent discharge quality.

Most of the transfer systems and some of the effluent system is comprised of above ground pipelines; the chemical sewer comprises steel lined channels, taking drainage from bunds around storage vessels and reactors, through different sumps and ultimately to the ETP. Drawings clearly show the surface

and foul drains, sumps and bypass valve locations for movements of out of specification SW to dirty lagoon and onto ETP instead of direct to clean lagoon. Even though the site inherited much of the equipment and infrastructure, elements of the secondary and tertiary containment were installed as late as 2000. There was an IC to look at drainage surveys of underground structures, including improvements required to be made to the diesel tank and refuelling area – this will be examined at the next routine inspection. The sumps are subjected to drop tests to ensure their integrity and as mentioned above, the operator has installed additional ground water monitoring wells adjacent to the ETP lagoons with a view to establishing integrity of these structures – although NRW will need to check the borehole logs of these installations to see if the advancement of the well and its response zone is capable of detecting leaks from the ETP dirty lagoon.

There are written schemes of examination for the primary containment and ABB usually inspect these. A brief look at the master list of critical kit on the planned preventative maintenance schedule was seen – this is an area that will be revisited.

The operator has briefed the regulator on business and investment and Hexion has been in a reasonable sales situation and it is believed the site is not under any risk and demand and development of products is expanding. Low oil prices has led to an increase in profitability; but these are economic cycles and low oil prices now can also adversely influence the sales price of Hexion's products. Hexion continue to roll out their company wide manufacturing excellence scheme – some outputs have been reviewed and improvement of certain site procedures and looking forward to maintaining skills resilience and developing succession planning. This scheme will be extended specifically to the ETP in the future. A support technician was employed in 2013 with a view for them to focus on utilities and energy and develop initiatives for improved performance. Additionally a new Environmental Technician, experienced in effluent treatment, has been employed to oversee the ETP, with former incumbent now employed as a senior process technician – the obvious benefit here is the retention of knowledge and skill with regard to the ETP kept on site.

Hexion to respond to the actions and consider the recommendations.

END